

DIALOG(R)File 352:Derwent WPI
(c) 2004 Thomson Derwent. All rts. reserv.

012817394 **Image available**

WPI Acc No: 1999-623625/199954

XRPX Acc No: N99-460370

Input voltage adjusting mechanism in power supply for organic electroluminescence display - adjusts voltage impressed to constant current drive circuit, based on detected amount of voltage drop of light emission display

Patent Assignee: TOYOTA JIDOSHA KK (TOYT)

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
JP 11272223	A	19991008	JP 9879075	A	19980326	199954 B

Priority Applications (No Type Date): JP 9879075 A 19980326

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
JP 11272223	A		4 G09G-003/20	

BEST AVAILABLE COPY

DIALOG(R)File 347:JAPIO
(c) 2004 JPO & JAPIO. All rts. reserv.

06330622 **Image available**
POWER UNIT FOR LIGHT EMISSIVE DISPLAY

PUB. NO.: 11-272223 [JP 11272223 A]
PUBLISHED: October 08, 1999 (19991008)
INVENTOR(s): KITA YASUSHI
APPLICANT(s): TOYOTA MOTOR CORP
APPL. NO.: 10-079075 [JP 9879075]
FILED: March 26, 1998 (19980326)
INTL CLASS: G09G-003/20; G09G-003/20; G09G-003/20; G05F-001/56;
 G09G-003/30

ABSTRACT

PROBLEM TO BE SOLVED: To provide a power unit for a light emissive display, achieving a reduction in temperature of a contact current drive circuit for drivingly controlling the light emissive display, while avoiding the improvement of a heat radiation system and decreases in light emissive functions.

SOLUTION: A constant current drive circuit 2 arranged in proximity to a light emissive display 1 drives the light emissive display 1 at a constant current to inhibit the fluctuation of the brightness thereof. A power circuit 3 adjusts, according to the drop of voltage of the light emissive display 1, a source voltage applied to the constant current drive circuit 2. Therefore, heating of the constant current drive circuit 2 for driving the light emissive display 1 at the constant current can be reduced, particularly when the drop of voltage of the light emissive display 1 is small, without further improvements of a heat radiation system around the light emissive display 1 which are not easy because of space and structural limitations and without limitations on the light emissive functions of the light emissive display 1.

特開平11-272223

(43)公開日 平成11年(1999)10月8日

(51) Int.CI. *

G09G 3/20

識別記号

612

F I

G09G 3/20

612 F

641

641 D

670

670 J

G05F 1/56

310

G05F 1/56

310 D

審査請求 未請求 請求項の数 2 O L (全4頁) 最終頁に続く

(21)出願番号 特願平10-79075

(71)出願人 000003207

(22)出願日 平成10年(1998)3月26日

トヨタ自動車株式会社

愛知県豊田市トヨタ町1番地

(72)発明者 喜多 靖

愛知県豊田市トヨタ町1番地 トヨタ自動
車株式会社内

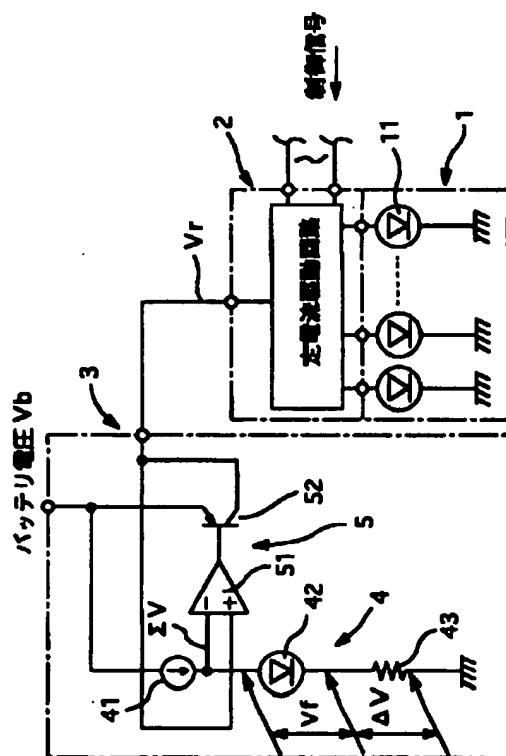
(74)代理人 弁理士 大川 宏

(54)【発明の名称】発光ディスプレイ用電源装置

(57)【要約】

【課題】放熱系の改良や発光機能の低下を回避しつつ、
発光ディスプレイ駆動制御用の定電流駆動回路の温度低
減を実現した発光ディスプレイ用電源装置を提供するこ
と。

【解決手段】発光ディスプレイ1に近接配置された定電
流駆動回路2が発光ディスプレイ1を定電流駆動してそ
の輝度変動を抑制する。電源回路3はこの定電流駆動回
路2に印加する電源電圧を発光ディスプレイ1の電圧降
下量に応じて調節する。これにより、スペース上及び構
造上容易ではない発光ディスプレイ1周りの放熱系の更
なる改良を図ることなく、発光ディスプレイ1の発光機
能に制限を加えることなく、発光ディスプレイ1の定電
流駆動用の定電流駆動回路2の発熱低減、特に、発光デ
ィスプレイ1の電圧降下量が小さい場合における定電流
駆動回路2の発熱低減を実現することができる。



【特許請求の範囲】

【請求項1】前記発光ディスプレイを定電流駆動する定電流駆動回路と、

前記発光ディスプレイの電圧降下量に正の相関を有する信号電圧を発生する電圧降下量検出回路と、

前記信号電圧に正の相関を有する電源電圧を前記定電流駆動回路に印加する電源電圧発生回路とを備えることを特徴とする発光ディスプレイ用電源装置。

【請求項2】請求項1記載の発光ディスプレイ用電源装置において、

前記電圧降下量検出回路は、前記発光ディスプレイに設けられたモニタ用発光素子と、前記モニタ用発光素子に定電流を給電する定電流源と、前記モニタ用発光素子の電圧降下量に所定の電圧値を加算して前記信号電圧とする電圧加算回路部とを有することを特徴とする発光ディスプレイ用電源装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、たとえば有機ELディスプレイなどの発光ディスプレイを駆動する電源装置に関する。

【0002】

【従来の技術】特開平2-148687号公報及び特開平7-65953号公報は、有機ELディスプレイを定電流駆動することにより輝度変化を抑止することを記載している。すなわち、上述した有機ELディスプレイの定電流駆動によれば、経時変化、温度変化、製造ばらつきなどに起因するその順方向バイアス電圧 V_f の変動にもかかわらず一定電流を通電することができるので、ディスプレイの輝度変化を大幅に低減することができる。

【0003】

【発明が解決しようとする課題】しかしながら、上記した定電流駆動式有機ELディスプレイ装置では、有機ELディスプレイの順方向バイアス電圧 V_f が小さい場合には、定電流駆動回路の電力損失増大によりその発熱量が増加して定電流駆動回路が高温となるという問題があった。

【0004】もちろん、この定電流駆動回路を装置の冷却しやすい部位に設けたり、特別の冷却手段を施したりすることも考えられるが、発光ディスプレイでは、その構成要素をなす多数のピクセルすなわち発光素子を個別に駆動する必要があるために定電流駆動回路はできるだけ発光ディスプレイに近接させて設ける必要がある。すなわち、定電流駆動回路と発光ディスプレイとを接続する配線が長いと、配線抵抗及び寄生容量の増大により、電力ロスの増大及びレスポンス低下のために定電流駆動回路の出力を増加させる必要があり、また配線規模が大きいケーブルの引き回しが必要となる。

【0005】しかし、このように定電流駆動回路を発光ディスプレイに近接配置する場合、高温となった定電流

駆動回路の熱が発光ディスプレイの発光特性に影響するという問題があった。また、発光ディスプレイに対する定電流駆動回路の熱的影響を防止するために定電流駆動回路を発光ディスプレイから離れた位置に設ける場合でも、このように多数の出力端子を必要とする発光ディスプレイ駆動制御用の定電流駆動回路とケーブルとの接続を簡素化するためには、フレキシブル基板に定電流駆動回路ICまたはペアチップを実装して樹脂モールドしたり、更には発光ディスプレイが実装される透明基板に定電流駆動回路を直接実装乃至集積することが行われるが、これらの場合、定電流駆動回路チップは樹脂で囲包されるので特に難しくなるという問題があった。

【0006】更にまとめて言えば、発光ディスプレイ駆動用の定電流駆動回路は多数の配線を有するケーブルを通じて発光ディスプレイ近傍あるいはこのケーブルの引き回しや接続に起因して放熱上不利な構造や位置取りを余儀なくされる場合があり、このため、この定電流駆動回路の温度低減が発光ディスプレイ実装上の大きな問題となっていた。

【0007】特に、車両室内など高温となる場合がある使用環境で用いようとする場合には、定電流駆動回路の温度上昇により、発光ディスプレイの性能を十分に発揮できないという弊害が予想される。本発明は上記問題点に鑑みされたものであり、放熱系の改良や発光機能の低下を回避しつつ、発光ディスプレイ駆動制御用の定電流駆動回路の温度低減を実現した発光ディスプレイ用電源装置を提供することをその解決すべき課題としている。

【0008】

【課題を解決するための手段】本発明の発光ディスプレイ用電源装置によれば、発光ディスプレイに近接配置された定電流駆動回路が発光ディスプレイを定電流駆動してその輝度変動を抑止する。本発明によれば特に、この定電流駆動回路に印加する電源電圧を発光ディスプレイの電圧降下量に応じて調節するので、スペース上及び構造上容易ではない発光ディスプレイ周りの放熱系の更なる改良を図ることなく、発光ディスプレイの発光機能に制限を加えることなく、発光ディスプレイ定電流駆動用の定電流駆動回路の発熱低減、特に、発光ディスプレイの電圧降下量が小さい場合における定電流駆動回路の発熱低減を実現することができる。

【0009】以下、更に詳しく説明する。本構成では、定電流駆動回路が発光ディスプレイ（正確にはその発光素子）を定電流駆動する場合、発光ディスプレイの順方向バイアス電圧 V_f が小さい場合にはその電圧降下量が小さくなり、上述した各種要因によりその順方向バイアス電圧 V_f を含むそのインピーダンスが増大すればそれに応じて電圧降下量は増大する。

【0010】そこで、本構成では、定電流駆動される発光ディスプレイの電圧降下量が小さい場合には定電流駆

動回路に印加する電源電圧を低下し、電圧降下量が大きい場合には定電流駆動回路に印加する電源電圧を増大させ、これにより発光ディスプレイの電圧降下量が小さい場合における定電流駆動回路の電圧降下の増大を減らして、その電力消費が所定レベルを超えるのを防止することができ、その結果として、放熱系の改良や発光機能の低下を回避しつつ、発光ディスプレイ駆動制御用の定電流駆動回路の温度低減を実現した発光ディスプレイ用電源装置を提供することができる。

【0011】請求項2記載の構成によれば請求項1記載の発光ディスプレイ用電源装置において更に、発光ディスプレイに設けられたモニタ用発光素子に定電流を給電してその電圧降下量を求め、求めた電圧降下量に所定の電圧値を加算して信号電圧を形成し、この信号電圧に正の相関を有する電源電圧を形成する。このようにすれば、回路規模をいたずらに増大することなく、発光ディスプレイの電圧降下量の変動に良好に追従する電源電圧(定電流駆動回路印加電圧)を作成することができる。

【0012】

【発明を実施するための態様】以下、本発明の好適な態様を以下の実施例を参照して具体的に説明する。

【0013】

【実施例1】本発明の発光ディスプレイ用電源装置の第一実施例を図1を参照して以下に説明する。1はそれぞれ直流駆動される640×480個の発光素子11を有するドットの有機ELディスプレイ(発光ディスプレイ)であり、フレキシブル基板(図示せず)によりそれをX-Yマトリックス駆動する定電流駆動回路2に接続されている。定電流駆動回路2はこのフレキシブル基板上にはんだボールなどを用いて直接表面実装された後、樹脂モールドされている。

【0014】定電流駆動回路2は、入力される制御信号の値に応じて有機ELディスプレイの各行配線や列配線をそれぞれ定電流駆動する多数の行配線駆動制御用又は列配線駆動制御用の定電流ドライバ回路からなるが、この定電流駆動回路自体の構成は本発明の主旨ではなく、かつ、周知の回路構成であるので、詳細な回路及び動作説明は省略する。

【0015】3は、定電流駆動回路2に電源電圧V_rを印加する電源回路であって、発光ディスプレイ1の電圧降下量(順方向バイアス電圧)V_fに正の相関を有する信号電圧V_sを発生する電圧降下量検出回路4と、信号電圧V_sに正の相関を有する電源電圧V_rを定電流駆動回路2に印加する電源電圧発生回路5とからなる。電圧降下量検出回路4は、バッテリ電圧V_bが印加される定電流源41、モニタ用発光素子42及び抵抗43を直列接続してなり、定電流源41は所定の定電流I_cをモニタ用発光素子42及び抵抗43に供給している。したがって、モニタ用発光素子42及び抵抗43の合成電圧降下量ΣVは、V_f+r·I_cとなる。rは抵抗43の抵

抗値である。言い換えると、合成電圧降下量ΣVはモニタ用発光素子42の電圧降下量V_fより常に一定値△V=r·I_cだけ大きくなるように設定されている。なお、モニタ用発光素子42は発光ディスプレイ1に上記640×480の発光素子11に隣接して各発光素子11と等しい大きさに形成されている。

【0016】電源電圧発生回路5は、オペアンプ51とpnPエミッタ接地トランジスタ52とからなり、オペアンプ51は上記合成電圧降下量ΣV=V_f+△Vと電源電圧V_rとの差電圧をpnPエミッタ接地トランジスタ52のベース電極に印加し、pnPエミッタ接地トランジスタ52は上記差電圧によりバッテリから定電流源41への給電をフィードバック制御し、これにより定電流源41に印加される電源電圧V_rはΣV=V_f+△Vに常に等しく調整される。

【0017】結局、この実施例によれば、定電流駆動回路2の電力ロスPはその出力電流をIとすれば、I×△V=I×r·I_cとなって、発光素子11の電圧降下量V_fに正相関を有してたとえば温度変化乃至経時変化するモニタ用発光素子42の電圧降下量に無関係となり、したがって、発光ディスプレイ用電源装置1の電圧降下量V_fが小さくても定電流駆動回路2の電力ロスが増大して、高温となることがない。

【0018】

【実施例2】本発明の発光ディスプレイ用電源装置の他の実施例を図2を参照して説明する。この実施例の装置は、実施例1の装置に比較して電源回路の構成だけが異なるので、その電源回路6だけを以下に説明する。

【0019】この電源回路6は、電圧降下量検出回路7と電源電圧発生回路8とからなる。電圧降下量検出回路7は、ベース抵抗70、エミッタホロワトランジスタ71、定電圧ダイオード72、モニタ用発光素子42、及び、このモニタ用発光素子42に定電流給電する定電流ドライバ回路20からなる。定電流ドライバ回路20は、有機ELディスプレイ1の各行配線や列配線をそれぞれ定電流駆動する多数の行配線駆動制御用又は列配線駆動制御用の定電流ドライバ回路21～2xと同一形状に定電流駆動回路2に形成されてモニタ用発光素子42に給電している。

【0020】抵抗71と定電圧ダイオード72との接続点には、モニタ用発光素子42の電圧降下量V_fと定電圧ダイオード72の電圧降下量△Vとの合成電圧降下量ΣVが印加され、これがダーリントン接続エミッタホロワトランジスタからなる電源電圧発生回路8に印加され、その結果、この実施例の電源回路6は、合成電圧降下量ΣVから電源電圧発生回路8のほぼ一定である順方向エミッタ・ベース間電圧降下量を差し引いた値に等しい電源電圧V_rを定電流駆動回路2に印加する。

【0021】したがって、実施例2によっても実施例1と同様の作用効果を奏すことができる。

[0022]

【変形態様】上記実施例では、電源電圧 V_r を発光素子 1 1 の推定電圧降下量とみなす電圧降下量 V_f に一定値 ΔV を加えた値としたが、一定値 ΔV の代わりに、電圧降下量 V_f の所定倍数とする場合、適宜変更してもよいことはもちろんである。

【図面の簡単な説明】

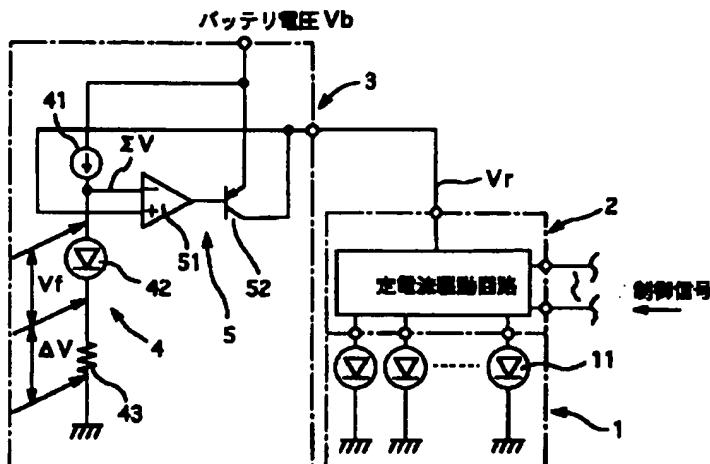
【図1】本発明の発光ディスプレイ用電源装置の一実施例を示す回路図である。

【図2】本発明の発光ディスプレイ用電源装置の他実施例を示す回路図である。

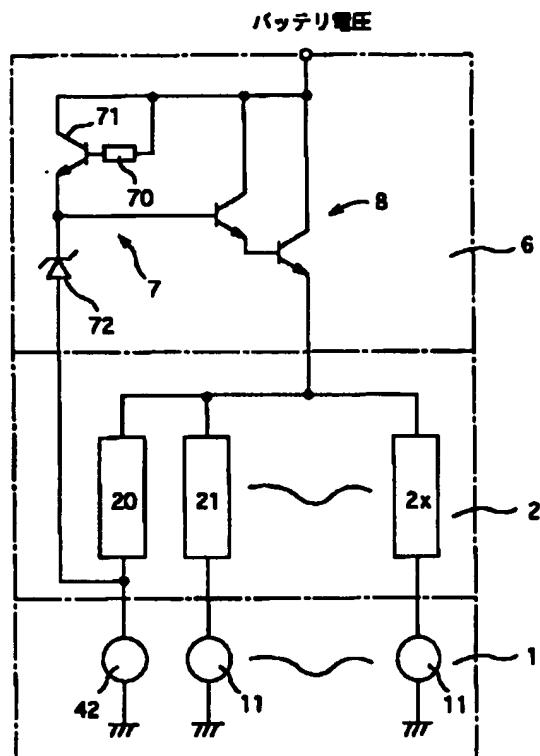
【符号の説明】

1は有機ELディスプレイ（発光ディスプレイ）、2は定電流駆動回路、4、7は電圧降下量検出回路、5、8は電源電圧発生回路、42はモニタ用発光素子、41は定電流源、43は抵抗（電圧加算回路部）、72は定電圧ダイオード（電圧加算回路部）。

〔圖1〕



〔圖2〕



フロントページの続き

(51) Int.Cl.*

G 0.9 G 3/30

識別記号

F I

G 0 9 G 3/30

J

(19) Japanese Patent Office (JP)

(12) Laid-open Public Patent Bulletin (A)

(11) Patent Application Laid-open No.: H11-272223

(43) Laid open Date: October 8, 1999

(51) Int. Cl. ⁶	Identification Number	FI			
G09G 3/20	612	G09G 3/20	612	F	
	641		641	D	
	670		670	J	
			670	L	
G05F 1/56	310	G05F 1/56	310	D	

Request of Examination: not made

The Number of Claims: 2 OL (4 pages in total)

(21) Application No.: H10-79075

(22) Application Date: March 26, 1998

(71) Applicant: 000003207

c/o Toyota Motor Corporation
1, Toyota-cho, Toyota-shi, Aichi

(72) Inventor: Yasushi Kita

c/o Toyota Motor Corporation
1, Toyota-cho, Toyota-shi, Aichi

(74) Agent: Patent Attorney Hiroshi Okawa

(54) [Title of the Invention]

POWER SUPPLY DEVICE FOR LIGHT-EMITTING DISPLAY

(57) [Abstract]

[Problem to be solved]

To provide a power supply device for a light-emitting display that realizes temperature lowering of a constant current drive circuit for controlling light-emitting display drive, while improving a radiation system and avoiding lowering of a light-emitting function.

[Means for Solution]

A constant current drive circuit 2 which is disposed close to a light-emitting display 1 drives the light-emitting display 1 with constant current and prevents its luminance change. A power supply circuit 3 regulates a power supply voltage which is applied to the constant current drive circuit 2, according to a voltage drop quantity of the light-emitting display 1. Hereby, heat lowering of the constant current drive circuit 2 for a constant current drive in the light-emitting display 1 can be realized, especially in the case where the voltage drop quantity of the light-emitting display 1 is small, without trying further improvement of a radiation system around the light-emitting display 1 which is not easy due to the space and structure thereof and without placing limits on the light-emitting function of the light-emitting display 1.

[Scope of Claims]

[Claim 1]

A power supply for a light-emitting display comprising:

a constant current drive circuit for driving the light-emitting display by constant current;

a voltage drop quantity detector circuit generating a signal voltage having positive correlation for the voltage drop quantity of the light-emitting display; and

a power supply voltage generating circuit applying a power supply voltage having positive correlation for the signal voltage to the constant current drive circuit.

[Claim 2]

A power supply for a light-emitting display according to claim 1, wherein the voltage drop quantity detector circuit comprising: a monitor light-emitting element provided for the light-emitting display; a constant current source for providing the monitor light-emitting element with a constant current; and a voltage adder circuit portion in which the signal voltage is made by adding predetermined voltage value to the voltage drop quantity in the monitor light-emitting element.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Belongs]

This invention relates a power supply which drives a light-emitting display such as an organic EL display.

[0002]

[Prior Art]

Japanese Patent application laid-open Nos. H2-148687 and H7-65953 illustrate that a luminance change is regulated by driving an organic EL display with constant current. That is to say, by driving the organic EL display with constant current, the luminance change in the display can be lowered drastically because it can pass a constant current despite a change of its forward bias voltage V_f which arises from a moment-to-moment change, a temperature change and a production tolerance.

[0003]

[Problem to be Solved by the Invention]

However, in the constant current drive-type organic EL display device, when a forward bias voltage V_f of the organic EL display is small, there is a problem that its heat value increases due to a power loss increase of a constant current drive circuit and the constant current drive circuit becomes high temperature.

[0004]

Of course, it is possible that the constant current drive circuit is disposed in the site where the device is easy to cool and a special cooling means is put. However a lot of pixels, namely light-emitting elements which constitute a light-emitting display need driving separately, the constant current drive circuit needs disposing as close to the light-emitting display as possible. That is to say, when a wiring which connects the constant current drive circuit to the light-emitting display is long, by increase of the wiring resistance and parasitic capacity, it is necessary to make output of the constant current drive circuit increase for increase of a power loss and response depression and extend a cable which is big wiring scale.

[0005]

However, when a constant current drive circuit is disposed close to a light-emitting display in this way, there is a problem that heat of the constant current drive circuit with high temperature influences a luminescence property of the light-emitting

display. In addition, when the constant current drive circuit is disposed in a position apart from the light-emitting display to prevent thermal effect of the constant current drive circuit on the light-emitting display, a constant current drive circuit IC or a bare chip is mounted over a flexible substrate so as to obtain a resin mold, and further the constant current drive circuit is directly mounted or integrated over a transparent substrate where the light-emitting display is mounted, for simplifying connection between the constant current drive circuit for controlling the light-emitting display device which is need of a lot of output terminals and a cable. However, in such a manner, since the constant current drive circuit chip is surrounded with a resin, there becomes a problem of large difficulty.

[0006]

In summary, there is a case where the constant current drive circuit for driving the light-emitting display is forced to be a disadvantage structure and location for heat radiation due to the extended cable and connection of vicinity of the light-emitting display or the cable through the cable having a lot of wirings. Therefore, the reduction in temperature of the constant current drive circuit has become a large problem of mounting the light-emitting display.

[0007]

Particularly, in the case of using at environment where it becomes high temperature such as in a vehicle room, a harmful effect is expected that sufficient performance of a light-emitting display cannot be offered due to temperature raise of a constant current drive circuit. The present invention is performed in view of the above problems. Here, it is a problem to be solved to provide the power supply for the light-emitting display that realizes temperature lowering of the constant current drive circuit for controlling light-emitting display drive, while improving a radiation system and avoiding lowering of a light-emitting function.

[0008]

[Means for Solving the Problem]

According to a power supply for a light-emitting display of the present invention, a luminance change is regulated by driving a light-emitting display disposed closed thereof with constant current. According to the invention, heat lowering of the constant

current drive circuit for a constant current drive in the light-emitting display can be realized, especially in the case where the voltage drop quantity of the light-emitting display is small, without trying further improvement of a radiation system around the light-emitting display which is not easy due to the space and structure thereof and without placing limits on the light-emitting function of the light-emitting display since a power supply voltage which is applied to the constant current drive circuit is adjusted as to the voltage drop quantity of the light-emitting display.

[0009]

Hereinafter, description is carried out in detail. In this structure, when a constant current drive circuit drives a light-emitting display (a light-emitting element to be exact) with constant current, the voltage drop quantity becomes small in the case where forward bias voltage V_f is small, and the voltage drop quantity is increased according to impedance including the forward bias voltage V_f due to the various factors.

[0010]

Thus, according to the structure, when the voltage drop quantity of the light-emitting display driven with constant current is small, the power supply voltage applied to the constant current drive circuit is lowered, and when the voltage drop quantity is large, the power supply voltage applied to the constant current drive circuit is increased. Therefore, the increase of the voltage drop quantity when the voltage drop quantity in the light-emitting display is small can be decreased and the power consumption can be prevented from exceeding the predetermined level. As a result, a power supply for the light-emitting display that realizes temperature lowering of the constant current drive circuit for controlling the light-emitting display drive, while improving a radiation system and avoiding lowering of a light-emitting function.

[0011]

According to the structure described in claim 2, a constant current is further applied to the monitor light-emitting element provided for the light-emitting display in the power supply for the light-emitting display described in claim 1, so as to figure out the voltage drop quantity, and the signal voltage is formed by adding predetermined voltage to the voltage drop quantity, and then, the power supply voltage with positive correlation is

formed. Accordingly, the power supply voltage (the constant current drive circuit apply voltage), which preferably follows the change in the voltage drop quantity of the light-emitting display can be formed without increasing the circuit size in vain.

[0012]

[Embodiment Mode of the Invention]

Hereinafter, the preferable mode of the present invention is described with reference to the following embodiment in the concrete.

[0013]

[Embodiment 1]

The first embodiment of the power supply for the light-emitting display is described below with reference to FIG. 1. Reference numeral 1 is a dot organic EL display (a light-emitting display) having 640×480 light-emitting elements 11 which is driven with direct current, and is connected with the constant current drive circuit 2 which drives itself by a flexible substrate (not shown) in X-Y matrix drive. The constant current drive circuit 2 is directly mounted on the flexible substrate using a solder ball, and then molded with resin.

[0014]

The constant drive circuit 2 is formed from a plurality of constant current drive circuit for columns and row wiring drive control. However, the structure of the constant current drive circuit itself is not a keystone of the present invention, and the circuit structure is well known, thereby omitting the description of the detailed circuit and the operation.

[0015]

Reference numeral 3 is a power circuit which applies power supply voltage V_r to the constant current drive circuit 2, which includes voltage drop quantity detector circuit 4 generating signal voltage V_s having positive correlation toward the voltage drop quantity (the forward bias voltage) of the light-emitting display 1 and the power supply voltage generating circuit 5 applying power supply voltage V_r having positive correlation in the signal voltage V_s toward the constant current drive circuit 2. The voltage drop quantity detector circuit 4 is formed of connecting a constant current source 41 to which battery

voltage V_b is applied, a monitor light-emitting element 42, and resistance 43 in series. The constant current source 41 supplies the predetermined constant current i_c to the monitor light-emitting element 42 and the resistance 43. Therefore the total voltage drop quantity $\sum V$ becomes $V_f + r \cdot i_c$. The r is a value of the resistance. In turn, the total voltage drop quantity $\sum V$ is set so as to increase by constant value of $\Delta V = r \cdot i_c$ by the voltage drop quantity V_f of the monitor light-emitting element 42. Note that the monitor light-emitting element 42 is formed so that the light-emitting display 1 is adjacent to the 640×480 light-emitting elements 11 and the monitor light-emitting element 42 has the same size as the each light-emitting element 11.

[0016]

The power supply voltage generating circuit 5 is formed of an operational amplifier 51 and a pnp grounded emitter transistor 52. The operation amplifier 51 applies the difference voltage between the total voltage drop quantity $\sum V = V_f + V$ and the power supply voltage V_r to an base electrode of the pnp grounded emitter transistor 52, and the pnp grounded emitter transistor 52 feedback-controls the supply from the battery to the constant current source 41 by the use of the difference of the voltage, thereby regulating the power supply voltage V_r applied to the constant current source 41 to $\sum V = V_f + \Delta V$ constantly and equally.

[0017]

Consequently, according to this embodiment, a power loss P of the constant current drive circuit 2, $I \times \Delta V$ becomes equal to $I \times r \cdot i_c$ when the output current is defined as I , has positive correlation for the voltage drop quantity V_f of the light-emitting element 11. And, for example, the power loss P becomes no relation to the voltage drop quantity of the monitor light-emitting element 42 which has a moment-to-moment change or a temperature change. Thus, even if the voltage drop quantity V_f of the power supply for the light-emitting display 1 is small, the power loss of the constant current drive circuit 2 increases, not resulting in high temperature.

[0018]

[Embodiment 2]

Other embodiment of the power supply for a light-emitting display of the present

invention is explained referring to FIG. 2. Because the device of the embodiment is different in only structure of a power supply circuit compared to the device of embodiment 1, only the power supply circuit 6 is explained hereinafter.

[0019]

The power supply circuit 6 is composed of a voltage drop quantity detector circuit 7 and a power supply voltage generating circuit 8. The voltage drop quantity detector circuit 7 is composed of a base resistor 70, an emitter follower transistor 71, a constant voltage diode 72, a monitor light-emitting element 42 and constant current driver circuit 20 feeding constant current to the monitor light-emitting element 42. The constant current driver circuit 20 is formed in the constant current drive circuit 2 with the same form as a lot of constant current driver circuits 21~2x for row wiring drive control or column wiring drive control which drive each row wiring and column wiring of the organic EL display 1 by each constant current, and it is fed to monitor light-emitting element 42.

[0020]

In connection point with the resistor 71 and the constant voltage diode 72, composite voltage drop quantity ΣV with voltage drop quantity V_f of the monitor light-emitting element 42 and voltage drop quantity ΔV of the constant voltage diode 72 is applied, and this is applied to the power supply voltage generating circuit 8 comprising Darlington connection emitter follower transistor, accordingly, power supply circuit 6 of the embodiment applies power supply voltage V_r which is equal in the value that subtracted in approximately constant forward voltage drop quantity between emitter base of the power supply voltage generating circuit 8 from composition voltage drop quantity ΣV to constant current drive circuit 2.

[0021]

Thus, the same operation-effect as the Embodiment 1 can be obtained in the Embodiment 2.

[0022]

[Deformation Mode]

In the embodiment, the power supply voltage V_r is to be a value of the voltage

drop quantity V_f considered estimated voltage drop quantity of the light-emitting element 11 to which the constant value ΔV is added. However, it is obvious that the power supply voltage V_r may be appropriately changed predetermined times of the voltage drop quantity V_f instead of the constant value ΔV .

[Brief Description of the Drawings]

[FIG. 1]

FIG. 1 is a circuit diagram which shows one embodiment of the power supply for a light-emitting display of the present invention.

[FIG. 2]

FIG. 2 is a circuit diagram which shows another embodiment of the power supply for a light-emitting display of the present invention.

[Description of Signs]

- 1: organic EL display (light emitting display)
- 2: constant current drive circuit
- 4, 7: voltage drop quantity detector circuit
- 5, 8: power supply voltage generating circuit
- 42: monitor light-emitting element
- 41: constant current source
- 43: resistor (voltage adder circuit portion)
- 72: constant voltage diode (voltage adder circuit portion)

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

BLACK BORDERS

- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER: _____**

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.